

## Massive Synovial Chondromatosis of the Foot: A Case Report

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Received date: Aug 25, 2013, Accepted date: Feb 25, 2014, Published date: Feb 28, 2014

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### Abstract

Synovial Chondromatosis is an uncommon benign disease. The knee is most frequently affected, but SC has been described also at the foot and ankle. Patients present with complaints of pain, locking, instability of variable duration and a palpable mass. Diagnosis is often delayed until the time of surgery. In this case report we focus on the clinical signs, differential diagnosis and especially in pearls and pitfalls for the surgical procedure. Lateral approach for resection of the tumor improves the patient foot deformity and ambulation.

**Keywords:** Massive synovial chondromatosis; Case report; Clinical signs; Differential diagnosis; Surgical pearls and pitfalls

### Introduction

Synovial chondromatosis (SC) is an uncommon proliferative process, most commonly involving the knee joint [1,2]. Histologically, it is characterized by the development of foci of cartilage in the synovial membranes [3]. This then precedes the formation of loose bodies, which may result in pain, with or without joint catching and locking [1-5]. The objectives of surgical treatment are to decrease pain, improve ambulatory function, and delay early osteoarthritis.

In this report we present a case that involved massive SC formation at the lateral-plantar midfoot and hindfoot areas, leading to pain and ambulatory dysfunction. Clinical signs, differential diagnosis, and surgical pearls and pitfalls are emphasized. Resection of the mass through a lateral approach resulted in resolution of pain, normal ambulatory function, and no recurrence at one year after the operation.

### Case Report

A 52-year-old man presented to our clinic with 20-year history of painful mass with swelling and deformity at the lateral-plantar aspect of his foot. This prevented him from wearing shoes. On physical exam, a lateral-plantar mass at the midfoot and hindfoot areas, measuring 8 cm by 6 cm, was seen and palpated (Figure 1).

Ankle range of motion (ROM) was not restricted, but there was restriction of subtalar ROM. There were no signs of local infection (i.e. skin color and temperature were normal, and no fluctuation or sinuses or fistulas were detected). Blood counts were within normal limits. On plain lateral ankle radiograph, 8\*4 cm blastic stippled calcified lesion without clear borders, without areas of lysis, was seen at the lateral-plantar aspect of the hindfoot and midfoot (Figure 2).

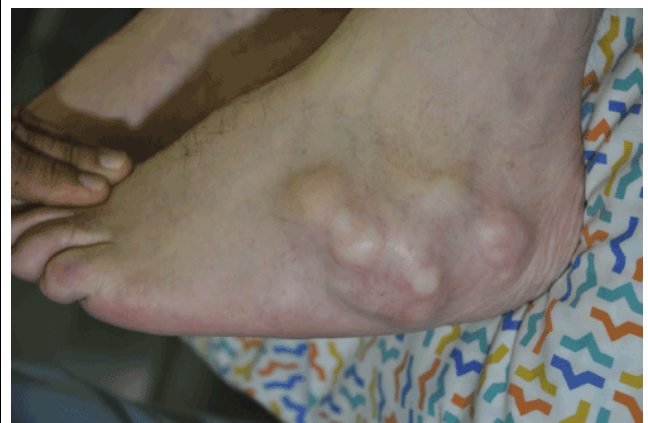
CT scan and MRI images demonstrated peroneal sheath involvement, and no sinus tarsi or subtalar joint bodies. The mass was clearly separated from the calcaneal bone and appeared as a “pushing

lesion”. Due to significant pain, inability to wear shoes comfortably, and gait dysfunction, surgery was indicated (Figure 3).

Under general anesthesia, a lateral approach to the midfoot and hindfoot areas was applied (Figure 4).

The Sural nerve was carefully dissected-out and protected with a vessel-loop. The peroneal tendons were explored. The sinus tarsi and the subtalar joint were also explored for loose bodies.

The tumor was then dissected-out as multiple cartilaginous masses (Figures 5 and 6). Once the mass was entirely removed, it appeared that a concavity was formed at the lateral aspect of the calcaneus, most likely as a result of direct pressure applied by the mass. Limited bone biopsy was taken to rule out bony infiltration (Figure 7). Two weeks after surgery full weight bearing was allowed. One year follow up, normal appearing foot with no recurrence (Figure 8).



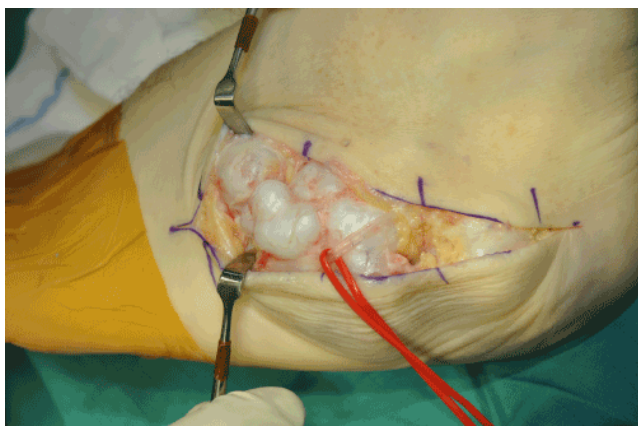
**Figure 1:** Lateral-plantar mass at the mid-foot and hind-foot.



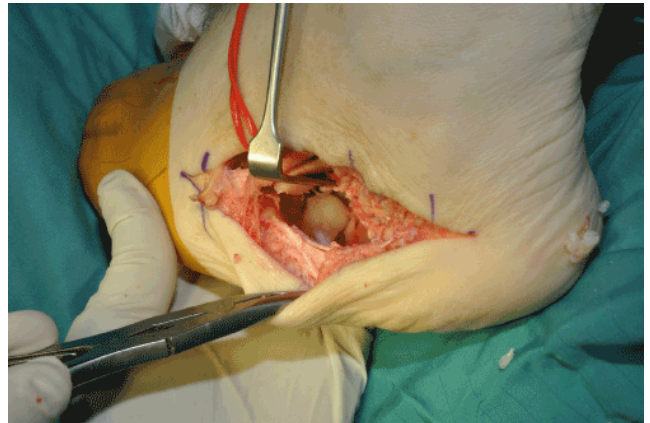
**Figure 2:** Radiography analysis of the foot.



**Figure 3:** CT and MRI analysis showing the involvement of Peroneal Sheath.



**Figure 4:** Surgical removal of tumour.



**Figure 5:** Tumour removal.



**Figure 6:** Cartilaginous mass along with tumour.



**Figure 7:** Concarvity appearance after the removal.



**Figure 8:** Histological analysis after the removal.

Histologically, the mass disclosed mild cytological atypia, osseous metaplasia, and mixoid stromal changes (Figure 6). After surgery, pain and ambulatory dysfunction resolved. AOFAS (American Orthopaedic Foot and Ankle Society) score [6] at one year after surgery was 89. The foot deformity did not recur (Figure 7).

## Discussion

Synovial chondromatosis (SC) is a relatively uncommon benign disease of uncertain etiology. It is most frequently observed in males at their 4th to 6th decades of life, and usually involves only a single joint. The knee is most frequently affected, but SC has been described also at the hip, foot and ankle, shoulder and temporo-mandibular joints [2-5,7-11].

SC is characterized by the development of foci of cartilage in the synovial membrane with subsequent loose body formation [5,12]. It is believed to be caused by synovial metaplasia, although some indirect evidence suggests a neoplastic origin [5]. The disease process was classified into three distinct phases: 1) The early phase involves only the synovial membrane, with metaplastic islands of cartilage in the synovium, without loose bodies. 2) The transitional phase shows active

intrasynovial proliferation of the cartilaginous masses and free loose bodies. 3) The later phase demonstrates only free, loose bodies, without any evidence of synovial metaplasia, but with occasional, slight inflammation [3].

SC is usually intra-articular, but extra-articular involvement has been reported [13]. Juxta-articular nodules present as soft-tissue masses, and they may be painful and progressively enlarge [14].

Patients present with complaints of pain, locking, instability of variable duration and a palpable mass. Symptoms can last for several years and the diagnosis is often delayed until the time of surgery [4].

On plain radiographs, smooth round calcified bodies are present with bone erosion. A CT scan can help differentiate SC from loose bodies secondary to degenerative osteoarthritis. MRI commonly shows areas of signal avoidance on all pulse sequences corresponding to calcifications. High signal on T2-weighted images are often associated with joint effusion. When SC penetrates bone, the margins are described as “pushing lesions”. The relative risk of malignant transformation is low and was reported as 5% [2].

Treatment objectives consist of decreasing pain and limiting the development of early osteoarthritis. All accessible loose bodies should be removed, and synovectomy is performed when the synovial membrane is seen to be producing more bodies [3]. Traditionally, SC of the ankle is treated by arthrotomy and debridement, but arthroscopic excision of the tumor has been recently described as well [15].

Differential diagnosis includes primarily myositis ossificans, tumoral calcinosis, and soft tissue osteosarcoma [16], but other disorders that may give rise to loose bodies should also be thought-off and include degenerative joint disease, osteochondritis dissecans, neurotrophic arthritis, tuberculous arthritis (rice bodies), and osteochondral fractures. To differentiate SC from low-grade chondromatosis, biopsy must include bone to rule out bone infiltration. Accurate diagnosis is important, because if the synovial origin of the cartilaginous proliferations is ignored, the evidence of cellular activity may lead to an erroneous diagnosis of chondrosarcoma [13].

Few reports discussed the presence of SC in the foot. These included the calcaneocuboid, tibiotalar, naviculocuneiform, and metatarsophalangeal joints [1,3,17-23].

Structure	Pitfalls	Tips
Skin	Blood supply	Look for previous incision
Subcutaneous tissue	Sural nerve injury during tumor excision	Sural nerve micro-dissection, followed by Vessel loop retraction throughout operation
Peroneal tendons	Peroneal tendons cut	Open peroneal sheath and retract tendons
Sinus Tarsi	Sinus Tarsi involvement	Debridement of the sinus tarsi tissue
Subtalar Joint	Intraarticular cartilage masses or loose bodies	Subtalar joint exploration and irrigation
Synovial tissue	Inflammation & malignization	Synovial tissue debridement and excisional biopsy
Calcaneous Bone	Bone infiltration	Bone biopsy
Multi-lobular tumoral mass	Incomplete resection	Thorough inspection of all intra- and juxta-articular spaces

**Table 1:** Pitfalls and tips for proper lateral foot tumor dissection.

The uniqueness of the case presented in this report is the massive involvement of the hindfoot and mid-foot areas, which made surgical excision challenging [24-31]. Each of the layers involved in and around the tumoral mass needed to be meticulously addressed to avoid damage to important intra and extra-articular structures (Table 1). This enabled complete excision of this multi-lobular mass with return to normal ambulation, and no recurrence at one year after the operation.

## Summary

SC may appear as massive disfiguring tumor that lead to pain and significant ambulatory disability. Awareness of the differential diagnosis and meticulously performed surgical dissection are the key for successful management.

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